



## “HYPONATREMIA: A STUDY ON AETIOLOGICAL FACTORS AND CLINICAL FEATURES”

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**ABSTRACT** Hyponatremia is considered as the most common electrolyte disorder in hospitalized patients. In the present study 100 cases of hyponatremia were investigated for aetiological factors and clinical features. Syndrome of inappropriate secretion of diuretic hormone (SIADH) constituted major group with 34 (34%) cases. The other causes of hyponatremia were congestive heart failure, renal failure, Diabetes mellitus, hypothyroidism and acute gastroenteritis. Common clinical features in mild hyponatremia were nausea (20%) vomiting (5%) headache (5%) and muscle cramps (5%). Asymptomatic cases constituted 60% of the total cases. However in severe cases of hyponatremia altered sensorium was the major clinical feature; the other clinical features observed in these cases were seizures, gait disturbance, dysarthria and coma.

**KEYWORDS :** Hyponatremia, Arginine Vasopressin, Hypervolemia, Aetiological factors, Clinical features.

### Introduction

Disturbances of body Sodium equilibrium are very common as sodium being the largest constituents of body fluids. The normal sodium levels are in the range of 135-145 mEq/L. Hyponatremia represents an excess of body water relative to body sodium content and is frequently referred to as a serum sodium concentration of less than 135 mEq/L(1).

Hyponatremia is reported to occur in about 6% of hospitalized patients. Mild hyponatremia (Plasma sodium levels 130-135 mmol/L) is found in as many as 15-30% of the hospitalized patients. Severe hyponatremia (Plasma sodium levels less than 120 mmol/L) particularly of rapid onset is reported to be associated with considerable morbidity and sometimes can be life threatening (2). Patients with hyponatremia can be classified as hypervolemic, euvolemic or hypovolemic hyponatremia. The hospital patients with hyponatremia have considerable additional mortality. Hyponatremia is also an important predictor of mortality in clinical conditions like heart failure, cirrhosis and acute pancreatitis (3)

Management depends upon the speed of onset of hyponatremia; its degree, duration and symptoms. The objectives of the present study are to determine incidence, aetiological factors and clinical features of patients with varying degrees of hyponatremia.

### Methodology

The study was initiated after taking approval of the Institutional Review Board (IRB, DCMS). Informed consents were taken from patients who participated in the study. A total of 100 hospitalized cases of hyponatremia were selected during the period from October 2015-August 2017. The cases were analyzed and reported by the Biochemistry Department (Princess Esra hospital, DCMS, Hyderabad).

Information regarding age, gender, lowest serum sodium levels (whenever multiple results were available in single patient). The clinical diagnosis and further clinical information suggesting the cause of hyponatremia was collected. The data were statistically analyzed. All the patients underwent complete clinical examination including examination of jugular venous pulse, blood pressure, respiratory, cardiovascular and central nervous systems. All the biochemical investigations required were carried out in the hospital's biochemistry laboratory. X-ray chest, TFT, 2D echocardiogram and ultrasound were done wherever indicated.

**Inclusion criteria:** All adult patients admitted to medical wards who were found to have serum sodium levels less than 135 mmol/l were included in the study (1). Cases below the age of 18 years as well as surgical cases were excluded.

In patients with clinical features of hyponatremia as well as healthy controls sodium, potassium, chloride and urea were estimated from the 5 ml venous blood drawn in plain sterile bottles and 2 ml blood in oxalate bottles for blood glucose estimation. Relevant tests were also performed on urine samples. Urine osmolality and plasma osmolality were also estimated (6).

### Results

Of the total hundred cases studied 56 were males and the remaining 44 were females. Mean serum sodium levels in males and female cases were 123.65 and 122.43 mmol/l respectively (Table 1). Details of the patients with regards to etiological factors associated with hyponatremia are shown in table 2. Syndrome of inappropriate secretion of antidiuretic hormone (SIADH) (due to different etiological factors) constituted the major cause with 34 (34%) cases (4). In this category 22 cases were of pneumonia, 2 were due to drugs, while 4 each were of COPD and malignancy. Two cases were suffering from HIV. In 6 cases of hyponatremia the underlying cause appeared to be due to mannitol therapy, while in 12 (12%) cases the aetiological factor was congestive cardiac failure (Table 2). In 8 the cause of hyponatremia was acute gastroenteritis and in 12 cases it was due to renal failure. Eight cases of diabetes mellitus had hyponatremia possibly due to associated renal failure. The number of cases belonging to hypothyroidism were 6 (6%) and 2 were of cirrhosis (2,3,5).

Details of mean serum sodium levels in relation to clinical features in mild and moderate hyponatremia are given in table 3. Of the total 37 cases of mild hyponatremia 20 (60%) were asymptomatic with mean serum sodium level 128 mmol/l. In nine cases nausea was the clinical feature. While in the remaining cases headache, vomiting, muscle cramps and lethargy were the clinical features. In the moderate hyponatremia group a total of 50 cases were recorded. Of which 10 (20%) were asymptomatic. Headache and nausea were the features in 6 cases (12%) each. Muscle cramps in 2 cases and lethargy was noted in 15 (30%) cases, mean sodium levels were less than 122 mmol/l of moderate hyponatremia (Table 3).

In the group of cases with severe hyponatremia (sodium serum levels less than 120 mmol/l) a total of 13 patients were observed. Details of the mean serum sodium levels in relation to clinical features in this group are given in table 4. It was observed that nine cases had altered sensorium as the clinical feature; the mean serum sodium levels in these cases were 114 mmol/l. Seizures were recorded in one case of severe hyponatremia (sodium levels 116 mmol/l). One case each was recorded with dysarthria and gait disturbances (Table 4). One case of severe hyponatremia had coma as the clinical feature (7). The mean serum levels of sodium in this group of severe hyponatremia was 114.65 mEq/L. Five patients in this group were found to have chronic hyponatremia while the remaining eight had acute hyponatremia.

**Table 1: Demographic details of hyponatremia patients along with mean serum sodium levels**

Gender	Number (Percentage)	Serum Sodium levels (mmol/l)
Males	56 (56%)	123.65
Females	44 (44%)	122.43
Total	100 (100%)	123.13

**Table 2: Details of the patients with regards to etiological factors associated with hyponatremia**

Causes of hyponatremia	Number of patients (percentage)
Congestive cardiac failure	12 (12%)
Acute gastroenteritis	8 (8%)
Renal failure	12 (12%)
*SIADH	34 (34%)
Pneumonia	22 (22%)
Drugs	2 (2%)
COPD	4 (4%)
Malignancy	4 (4%)
HIV	2 (2%)
Mannitol induced	6 (6%)
Diuretics	8 (8%)
Cirrhosis	2 (2%)
Diabetes Mellitus	8 (8%)
Hypothyroidism	6 (6%)
Others	4 (4%)

**Table 3: Mean serum sodium levels in relation to clinical features in cases with mild and moderate hyponatremia**

Clinical features	Mild			Moderate		
	No. of patients	Percent age	Mean Sodium levels	Number of patients	Percent age	Mean Sodium levels
Asymptomatic	20	60 %	128	10	20%	123
Headache	2	5%	129	6	12%	125
Nausea	9	20%	126	6	12%	122
Vomitings	2	5%	127	10	20%	123
Muscle cramps	2	5%	130	2	4%	121
Lethargy	2	5%	128	15	30%	122
Restlessness	-	-	-	1	2%	123
Total	37*	100%	-	50**	100%	122

\*\* include 35 acute and 15 chronic cases of hyponatremia

\*11 cute and 25 chronic hyponatremia cases

**Table 4: Mean serum Sodium levels in relation to clinical features in cases of severe hyponatremia**

Clinical features	No. of patients (Percentage)	Mean serum Sodium levels
Altered sensorium	9 (69.2%)	114
Seizures	1 (7.7%)	116
Dysarthria	1(7.7%)	118
Gait disturbance	1(7.7%)	117
Coma	1(7.7%)	108
Total	13*-	114.65

\*includes 8 cases with acute hyponatremia and with 5 chronic hyponatremia

## Discussion

In the present study out of 100 hospitalized hyponatremia cases studied, syndrome of inappropriate diuretic hormone (SIADH) constituted major group with 34 (34%) cases (table-2). The other causes of hyponatremia were Renal failure, congestive heart failure, Diabetes mellitus and hypothyroidism. Frequently observed clinical features in mild hyponatremia were Nausea (20%) Vomitings (5%) Headache (5%) etc. Sixty percent cases were asymptomatic. However in cases with severe hyponatremia altered sensorium was the major clinical feature (Table-4).

The significance of studies on pathophysiology and diagnosis of hyponatremia cases assume clinical significance in view of considerable morbidity and mortality associated with this electrolyte disorder particularly in hospitalized cases. Hyponatremia is generally

managed on an individual basis, with care taken to ensure safe and controlled serum sodium correction. Traditional therapies for hyponatremia have limitations that render them sub-optimal (8). These include the time to serum sodium correction with fluid restriction and the potential for additional electrolyte losses with diuretics.

An ideal treatment for hypervolemic and euvolemic hyponatremia would provide solute free water excretion with prompt, controlled correction of serum sodium. New medications that antagonize arginine vasopressor (AVP) including a dual V1A/V2 receptor antagonist and V2 receptor antagonist represent advancement over current therapies (7).

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